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ELDORADO

Mining and Refining Limited
and subsidiary Eldorado Aviation Limited

1967 Annual Report

Eldorado Mining and Refining Limited

Head Office: Suite 800, 151 Slater St., Ottawa 4, Canada
General Administration Office: Port Hope, Ontario, Canada

DIRECTORS

W. J. Bennett W. M. Gilchrist* F. R. Hadley W. F. James*
Gordon Lawson* J. E. Sydie W. G. Thompson

*Members of Executive Committee

OFFICERS

President: W. M. Gilchrist
Vice-President, Mining and Exploration: H. E. Lake
Vice-President, Refining: J. C. Burger
Secretary: R. C. Powell Treasurer: J. C. Orr
Director of Administration: C. Baschenis

MANAGERS

Beaverlodge Operation: A. R. Allen Refinery: R. M. Berry
Research and Development: G. F. Colborne

DISTRICT OFFICES

Refining and Sales: Port Hope, Ontario Beaverlodge Mine: Eldorado, Saskatchewan
Metallurgical Laboratories: Tunney's Pasture, Ottawa, Canada
Vice-President, Mining and Exploration: 10040 - 105th Street, Edmonton, Alberta
Western Purchasing and Employment Office: 10040 - 105th Street, Edmonton, Alberta

ELDORADO AVIATION LIMITED

HEAD OFFICE: Suite 800, 151 Slater St., Ottawa 4, Canada
OPERATIONS OFFICE: No. 11 Hangar, Municipal Airport, Edmonton, Alberta

DIRECTORS

W. J. Bennett A. B. Caywood W. M. Gilchrist
H. E. Lake P. L. P. Macdonnell

OFFICERS

President: H. E. Lake
Secretary: R. C. Powell Treasurer: J. C. Orr
General Manager: G. F. Frank

Eldorado Mining and Refining Limited Sales Agencies Abroad
Europe excluding Great Britain: N.V. Internationale Ertshandel "Wambersie", P.O. Box 1439, Calandstraat 7a, Rotterdam, Netherlands
Japan: Marubeni-Iida Co. Ltd., P.O. Box Central 595, Tokyo

Annual Report 1967

Eldorado Mining and Refining Limited

and subsidiary Eldorado Aviation Limited

President's Letter

The Honourable Jean-Luc Pepin,
Minister of Energy, Mines and Resources,
Ottawa, Ontario.

Sir,

On behalf of the Board of Directors, and in accordance with Section 85(3) of The Financial Administration Act, I have the honour to submit the Annual Report of Eldorado Mining and Refining Limited and its subsidiary Company, Eldorado Aviation Limited, for the year ended December 31, 1967.

For the first time since 1959, Eldorado can report an upturn in uranium production in Canada. The amount produced by all Canadian companies during 1967 was approximately 8,357,000 pounds of U_3O_8 , 1,000,000 pounds better than the 1966 total. Deliveries were made as scheduled under the contract with the United Kingdom Atomic Energy Authority, the only long-term export contract held by the industry which called for deliveries in 1967. The quantity of concentrates placed in the Canadian government stockpile was about 1,246,000 pounds short of the permissible total. Of the four mines holding stockpiling agreements, only one made significant deliveries.

Long-term contracts in excess of 17,000 tons were entered into in 1967, bringing to 39,000 tons

the total amount of uranium now committed by Canadian producers for delivery between 1968 and 1983. Negotiations for additional sales are in progress with a number of utilities and governments.

Rapid Growth of Demand

The general statements that follow regarding the uranium demand and supply situation will, to some extent, be a repetition of what has appeared in the last three Annual Reports, but the degree of certainty is greater. The estimates of future demand have increased across the board, and the time remaining in which to prepare to meet these requirements has been shortened by one year. Moreover, no significant additions to western world reserves have been reported. All of this tends to bring more sharply into focus the situation that will be developing in the 1970's and in the early 1980's.

The firm orders for nuclear power reactors have to date exceeded, and are continuing to exceed, all forecasts. The total value of orders held by U.S. manufacturers alone exceeds \$6 billion. It is clear that the annual production possible from the western world's present reserves of uranium, proven and developed, will not meet the demand beyond 1973, and possibly not even in that year. This means that the increase in demand from that time on, as well as the replenishment of the known re-

sources, must be met by production from hoped-for extensions of the proven reserves, and to a much larger extent from orebodies that have yet to be found and developed.

Problem of Capacity and Costs

Some appreciation of the magnitude of the physical problem facing the mining industry is possible when it is realized that the 47,000 tons of U_3O_8 required to be mined in 1975, and approximately double that amount in 1980, must be produced from ores that, from the evidence at hand, will not average more than $2\frac{1}{4}$ lbs. of U_3O_8 per ton. Therefore, in 1975, at least 42 millions of tons of ore will have to be mined and



W. M. Gilchrist

processed and 80 millions of tons in 1980. In 1959, the year in which the western world produced 43,350 tons of U_3O_8 , the peak annual production to date, the ore processed averaged slightly less than 2 lbs. per ton. It should also be recalled that the capital and preproduction investment required for mining and milling facilities varied between \$20,000 and \$33,000 per ton day in the 1950's. On this basis, and allowing for higher costs, approximately \$4 billion will be required between now and the late 1970's for new production capacity. It is difficult to see anything but a very substantial increase in the price to be paid by the utilities for the raw material of their nuclear fuel, and indeed the trend to higher prices has begun. Utilities in the United States are now paying in excess of \$7 per pound for domestic uranium.

Search for Ore Intensified

Exploration activity is gaining momentum, but the field work undertaken in Canada during 1967 was largely of a preliminary nature. Admittedly, more claims were staked in connection with uranium exploration than ever before in any one year of our history, and the amount of ground now held for this purpose far exceeds that of the peak of the 1950's, but the amount of time and money spent in actual exploration has to date not been large. However, many programmes are in the planning stage, and 1968 should see a marked increase in the ex-

penditure on the detailed examination of the claims now held by the various organizations involved. In the United States the renewal of uranium exploration is somewhat further advanced than in Canada, in that 10,764,000 feet of exploration drilling was done in 1967; but, estimates indicate that the reserves which can support production at a price of \$8 per pound increased by only 7,000 tons of U_3O_8 , and that perhaps 100,000 tons had been added in the \$10 price range. As far as the rest of the western world is concerned, it can be said that relatively little effort has as yet been put into the renewed search for uranium.

Time Factor Is Vital

If, by the end of this year, significant additions have not been made to what the western world now considers to be reserves, much lower grade material than that treated in the past will have to be considered. Moreover, the time remaining in which to prepare such material for production is too short even now and will be drastically so by the time another year has passed.

The governments and utilities that have committed themselves to nuclear power programmes will have to take a much more active and realistic interest in the uranium supply problem in order to be certain that the necessary quantities of U_3O_8 will be available when needed. There must be a recognition of the hard fact that, while an organized exploration effort offers no guarantee that the required quantities of material will be available by any given date, the growing need for additional electrical energy has imposed very rigid start-up dates for the reactors now on order.

COMMENTS ON ELDORADO OPERATIONS

The Company's profit for the year, while better than in the previous year, again compares unfavourably with profits of the years prior to 1966, when revenues from the long-term contracts with the USAEC and the UKAEA were substantially greater. It will be recalled that it has been a long term objective of your Company to keep the mine well developed and the operation maintained in a state of readiness to take full advantage of the developing markets for uranium. In pursuit of this objective, the amount and cost of development work done in 1967 were both significantly greater than in the previous year, and increased expenditures were made on programs designed to attract,

train and retain a work force of competent people in adequate numbers. Both of these factors have naturally had an adverse effect upon the year's profit.

Substantial Ore Reserves

At the mine, with the high level of development work, proven and probable ore reserves were maintained. The geological nature of the vein-type deposits of the mine does not permit the outlining of large reserve tonnages ahead of production; nevertheless, the year's work indicated the existence of substantial tonnages of ore in the possible and prospective categories. In addition to the main mine, the new Hab mine which will come into production in 1969, has probable reserves for more than five years at an annual production rate of 250 tons of U_3O_8 , with a potential for additional ore.

Major Projects at Refinery

At the refinery, apart from routine operations, two major projects were advanced. Firstly, work was continued throughout the year on the zirconium process and plant design. This culminated in a decision to begin construction of a production

plant early in 1968. Secondly, intensive studies were carried out on the economics and feasibility of the production of uranium hexafluoride (UF_6). This compound is the form in which uranium is fed to the diffusion plants for enrichment. Since most of the world's nuclear reactors will employ enriched fuel, most of Canada's uranium sold abroad will eventually be enriched. It is, therefore, in the national interest to carry uranium processing to this further stage, and your Company, with its existing UO_3 refinery and its body of expertise in uranium processing, is in an advantageous position to pursue this objective.

Extensive Research Programme

The Research and Development Division was again active in support of development and process control programmes at the mine and the refinery, and carried out metallurgical and other investigations for a number of private companies. The Division's laboratory is particularly well adapted to undertake sophisticated studies of metallurgical and chemical problems for industry, not confined to the uranium field, and the number of companies taking advantage of these services is growing.

Canada's Uranium Sales 1955-1967

to the United States Atomic Energy Commission and
the United Kingdom Atomic Energy Authority

POUNDS U_3O_8 SOLD

DOLLAR VALUE OF SALES

	<i>Industry Total</i>	<i>Eldorado</i>	<i>Other Producers</i>	<i>Total</i>
1955	2,030,767	\$ 23,687,582	\$ 1,190,547	\$ 24,878,129
1956	4,223,704	21,511,508	20,785,781	42,297,289
1957	12,152,916	26,554,646	98,985,240	125,539,886
1958	26,796,084	33,010,520	246,904,045	279,914,565
1959	30,996,065	29,998,052	295,330,230	325,328,282
1960	24,960,435	31,720,083	234,037,824	265,757,907
1961	19,270,884	24,786,036	177,544,698	202,330,734
1962	17,080,037	21,718,388	151,964,007	173,682,395
1963	15,216,812	21,292,683	118,607,491	139,900,174
1964	11,259,229	14,271,161	62,027,531	76,298,692
1965	7,059,466	15,310,978	39,817,644	55,128,622
1966	4,718,364	11,588,234	28,764,455	40,352,689
1967	2,542,155	194,693	27,688,523	27,883,216
	<u>178,306,918</u>	<u>\$275,644,564</u>	<u>\$1,503,648,016</u>	<u>\$1,779,292,580</u>

Will Need Extra Capital

As indicated in reports of prior years, a sizeable part of the Company's surplus funds was used to finance the 12,000-ton uranium contract which the Company holds with the United Kingdom Atomic Energy Authority. At year end, this long term receivable stood at approximately \$25,700,000. In order to finance the substantial capital expenditures proposed, it will therefore be necessary for the Company to borrow rather large amounts of capital during the next four years, unless early payment of this large receivable can be arranged. To keep its loans as low as possible, the Company will, in its long-term contracts, seek to arrange for substantial prepayments on future deliveries.

Since 1944 the Company has returned to the government \$34,740,000 in the form of dividends and redemption of shares, as well as having paid \$28,969,000 in income taxes. It has contributed \$4,045,000 in royalties to the government of the

Province of Saskatchewan, and has paid grants in lieu of municipal taxes in four municipalities to a total of almost \$4,000,000.

The wholly-owned subsidiary, Eldorado Aviation Limited, continued to provide satisfactory air support to the Company's mining and exploration activities, and to serve the varied needs of the Northern Transportation Company, another subsidiary.

The loyalty and efforts of the employees of the Company and its subsidiaries is, with pleasure and gratitude, again acknowledged by your Board of Directors.

For the Directors,

W. M. Gilsbunt

President

Ottawa, Canada
February 27th, 1968

General Report

For the Year Ended Dec. 31st., 1967

Eldorado Mining and Refining Limited *and its wholly-owned subsidiary Eldorado Aviation Limited*

This General Report comments upon the operations of both Eldorado Mining and Refining Limited and its wholly-owned subsidiary, Eldorado Aviation Limited, for the year ended December 31, 1967.

Income

Net income amounted to \$269,548, compared with \$176,195 in 1966. Sales revenue was marginally higher, and the cost of goods sold slightly lower, than in the previous year. Whereas in 1966 most of the Company's sales revenue was derived from deliveries to the United Kingdom, revenue from this source was minimal in 1967. Other income of \$701,639 was thirty-five per cent less than in the previous year, largely because of reduced interest earnings on a lower volume of available funds.

Taxes

As in 1966, no provision for income tax has been required, because of substantial capital cost allowances.

Grants in lieu, equal to taxes at current rates, were again paid to those municipalities in which the Company's properties are situated. In 1967, such grants to the municipalities of Uranium City, Edmonton, Port Hope and Ottawa amounted in all to \$436,481.

Dividends

In order to conserve cash for capital expenditures in the coming year, the Board omitted payment of a dividend in 1967. The total remitted to the Receiver General of Canada in dividends and the redemption of shares since the Crown acquired ownership of the Company in 1944, stands at \$34,740,000.

Capital Expenditures

During 1967, a total of \$2,312,000 was spent for housing and for new plant and equipment installations. Of this total, \$771,000 represents new rental housing in Uranium City for mine employees; \$1,116,000 was expended on mine plant and equipment, \$144,000 on refinery plant, \$202,000 on the

zirconium plant, and \$37,000 on research equipment.

The capital expenditures program for 1968 amounts to \$10,297,000. The major projects included in this amount are the new plant for zirconium production, \$7,384,000; employee housing and service store, \$1,150,000; mine and mill equipment, \$1,514,000.

Mine Operation

Production from the Beaverlodge mine in 1967 was 2,003,369 pounds of U_3O_8 from 561,434 tons of ore, compared to 1,687,501 pounds from 511,446 tons in 1966. The cost per pound of U_3O_8 produced increased by 5% over 1966. The higher unit cost is largely attributable to the costs of recruitment, accommodation, benefits, training and excessive overtime associated with a continuing manpower problem, with high labour turnover, and the consequent unsatisfactory productivity per man shift. A further contributing factor was a heavier development program, including drifting and raising of 2,775 feet and 2,414 feet respectively greater than in the previous year.

Comparative production statistics, not including custom ore treated, for the past fifteen years are:

	Tons of Ore Treated	Pounds of U_3O_8 Recovered	Average Recovery Pounds Per Ton
1967	561,434	2,003,369	3.57
1966	511,446	1,687,501	3.30
1965	536,132	1,800,467	3.36
1964	522,148	1,837,029	3.52
1963	544,177	1,855,212	3.41
1962	563,580	1,959,788	3.48
1961	542,157	2,214,894	4.09
1960	625,127	2,454,400	3.93
1959	657,521	2,392,770	3.64
1958	676,354	2,507,663	3.71
1953-1967 inclusive	6,946,385	25,784,358	3.71

A three year comparison of mine development statistics, together with cumulative totals from the beginning of operations, follows:

(in feet)	1965	1966	1967	Cumulative Totals
Shaft Sinking	915	—	—	8,041
Drifting and cross-cutting	20,557	22,392	25,167	295,555
Raising	5,480	6,339	8,753	97,741
Diamond Drilling (underground)	97,002	83,419	111,603	1,263,509
Sludge Drilling	2,491	5,827	4,742	126,452

Ore reserves were maintained and at year-end stood at 2,000,000 tons, grading 0.21% U_3O_8 , in the

proven, probable and pillar categories. If possible ore is included, reserves reach 3,200,000 tons, grading 0.22%.

Prepare New Mine for Production

Pre-production preparations at the new Hab mine, seven miles distant from the main mine, proceeded on schedule. Boilers and compressors were installed in a service building and a mine dry and office were completed, together with a power line, oil storage tanks, mine air heating system and water supply system. Two adits, one as a haulage-way and the other to house shops and hoistroom, were almost completed by year-end, as was the internal headframe. It is expected that shaft sinking will commence early in February and be completed in August. Production is scheduled for early 1969. The costs in respect of the Hab mine have been deferred against future production.

Capital projects completed during the year included a new underground fill storage system in the lower section of the Fay mine, a timber treatment plant, closed-circuit television on the ore hoist, necessary additions to production and mill equipment, and rental housing in Uranium City.

The capital program for 1968 includes further employee housing and service store in Uranium City, an enlargement of the fine ore bin capacity in the mill, replacement of some mill conveyor belts, an increase in capacity of the Verna mine air system, and major replacements of equipment throughout the 15-year old plant.

Exploration work continued on the Company's properties surrounding the main mine area; although a considerable program of diamond drilling was carried out, no new ore bodies of consequence were outlined. A program of surface exploration will continue during 1968. Land held by the Company under the Saskatchewan Mineral Regulations amounts to approximately 29,000 acres.

Refinery Operations

The solvent extraction circuit was operated at about two-thirds of capacity for a period of forty weeks during 1967, to refine UO_3 from concentrates delivered under the Government stockpile, and to produce UO_3 for sale and inventory from the Company's own concentrates.

During the remaining ten operating weeks of the year, the circuit was employed on a pilot operation



The well-designed townsite, attractive dwellings and the pleasant community life at Eldorado's Beaverlodge Operations, as well as greater provision for suitable employee housing in nearby Uranium City, are important factors in maintaining morale and efficiency at the mine.

for the production of nuclear pure zirconium from zircon sands.

The quantity of natural ceramic grade UO_2 powder for reactor fuel produced in 1967 increased by 100% over the previous year. Under contracts with Ontario Hydro for this material, the quantity should again double in 1968, and by 1972 a production rate of 350 tons per year will have been reached. This expanding requirement will necessitate a conversion from the present batch process to a continuous circuit, and development work to this end was carried out in 1967.

Production and sales of enriched UO_2 were lower than in the previous year. Approximately one-third of sales were to export markets.

Operations in the metallurgical and casting areas continued to be widely diversified, producing a range of alloys from depleted, natural and enriched uranium metal. Fuel development contracts exceeded the 1966 level by 35 per cent.

Again working with the Company's Research and Development Division, the refinery staff continued to participate in the zirconium development program, including the operation of a pilot plant. By

year end, the design of a production facility to be built in 1968 was well underway, and negotiations had been completed for the acquisition, by long-term lease, of a building site contiguous with the Company's existing property.

Sales and Promotion

Three major long-term sales contracts were consummated during the year. Ontario Hydro has undertaken to purchase a total of 1,300 tons of U_3O_8 between 1967 and 1977, and has contracted for the conversion of a similar quantity of concentrates to UO_2 , between 1967 and 1973. A power

utility in West Germany will buy not less than 800 tons of U_3O_8 , for delivery commencing in late 1968, and a sale of 500 tons of U_3O_8 in concentrates was made to a Japanese utility for future shipment. Negotiations through the Company's European and Japanese sales agents with a number of other utilities are underway, not only for the sales of concentrates, but for their conversion to uranium hexafluoride (UF_6) in the Company's proposed new facility.

All sales of uranium for export have been made subject to the applicable nuclear safeguards provisions.

GENERAL REPORT Continued on Page 16

Eldorado's new Hab Mine, seven miles distant from the main mine of the Company, is being prepared to come into operation in 1969. The aerial photograph shows only the adits and service building, but work is well advanced.



ELDORADO MINING AND REFINING LIMITED

Statement of Income and Expense

for the year ended December 31, 1967

(with comparative figures for the year ended December 31, 1966)

	1967	1966
Income:		
Sales — Company's products and services	\$ 14,523,678	\$ 14,297,359
Expense:		
Cost of products and services sold	12,292,999	12,504,934
Depreciation	629,842	670,437
Scientific research	629,330	692,123
Grants in lieu of municipal taxes	436,481	357,889
Selling and shipping	351,346	249,364
Exploration	223,359	405,787
Administration	392,412	314,651
	<u>14,955,769</u>	<u>15,195,185</u>
Net loss from operations	432,091	897,826
Interest and other non-operating income (net)	701,639	1,074,021
Net Income:	<u>\$ 269,548</u>	<u>\$ 176,195</u>

The accompanying notes are an integral part of the financial statements.

Eldorado Mining and Refining Limited

(Incorporated under the laws of the Republic of South Africa)

BALANCE SHEET

at December 31, 1967

(with comparative figures for 1966)

ASSETS	1967	1966
Current Assets:		
Cash	\$ 584,935	\$ 413,354
Deposit with Receiver General	6,000,000	10,000,000
Treasury bills and short-term deposits	1,897,290	6,275,000
Accounts receivable	4,981,639	3,702,901
Advances in respect of concentrates to be received	13,412,500	17,400,000
Concentrates and refinery products valued at lower of cost or realizable value	4,989,668	6,124,068
Operating and general supplies, at cost	2,739,533	2,502,157
Prepaid expenses	118,753	115,639
	<u>34,724,318</u>	<u>46,533,119</u>
Deferred accounts receivable in respect of concentrates delivered (Note 1) ..	33,698,097	25,718,945
Advances in respect of concentrates to be received in later years	1,200,000	12,062,500
	<u>34,898,097</u>	<u>37,781,445</u>
Investments and Loans:		
Investments in wholly-owned subsidiary companies, at cost (Note 2) ..	187,153	187,153
Employees' housing loans	281,386	262,311
Municipal Corporation of Uranium City and District, 5% and 6 1/2% debentures, maturing 1975-1979	684,410	736,372
	<u>1,152,949</u>	<u>1,185,836</u>
Unamortized pre-production and mine development expense	787,137	—
Capital Assets:		
Property, plant and equipment, at cost	48,463,832	46,250,885
Less: Accumulated depreciation	45,677,657	45,154,061
	<u>2,786,175</u>	<u>1,096,824</u>
	<u>\$ 74,348,676</u>	<u>\$ 86,597,224</u>

The accompanying notes are an integral part of the financial statements.
Approved on behalf of the Board

J. E. SYDIE, Director

W. G. THOMPSON, Director

Refining Limited

(Canada Corporations Act)

SHEET

31, 1967

(December 31, 1966)

	LIABILITIES	1967	1966
Current Liabilities:			
Accounts payable	\$	4,590,898	\$ 1,894,216
Advance payments in respect of concentrates to be delivered		14,686,900	19,846,375
		<u>19,277,798</u>	<u>21,740,591</u>
 Advance payments in respect of concentrates to be delivered in later years . .		<u>1,920,000</u>	<u>11,962,500</u>
 Excess of sales over costs and expenses of concentrates procured from other producers, to be discharged before completion of contracts (Note 3) . .		<u>1,118,630</u>	<u>1,131,433</u>
 Capital:			
Capital Stock:			
Authorized — 110,000 shares of no par value			
Issued — 70,500 shares, fully paid		6,586,080	6,586,080
Surplus		45,446,168	45,176,620
		<u>52,032,248</u>	<u>51,762,700</u>
		<u>\$ 74,348,676</u>	<u>\$ 86,597,224</u>

I have examined the above Balance Sheet and the related Statement of Income and Expense and have reported thereon under date of February 14, 1968 to the Minister of Energy, Mines and Resources.

A. M. HENDERSON,
Auditor General of Canada

Eldorado Mining and Refining Limited

Notes to Financial Statements

1. Deferred Accounts Receivable

The contract with the United Kingdom Atomic Energy Authority for the sale of 12,000 tons of uranium in concentrates provides for certain deliveries on which payments do not become due until later years of the contract period. The account thus deferred amounting to \$25,718,945 will be recovered during the years 1971-73 in equal annual instalments. The balance of \$7,979,152 is receivable under contracts to which reference is made in Note 4.

2. Subsidiary Companies

The assets, liabilities, income and expense of the Company's two wholly-owned subsidiaries, Eldorado Aviation Limited and Northern Transportation Company Limited have not been included in the financial statement of Eldorado Mining and Refining Limited.

The net expenses of Eldorado Aviation Limited are recovered from Eldorado Mining and Refining Limited and Northern Transportation Company Limited. The aggregate undistributed profits of Northern Transportation Company Limited as at December 31, 1967 amounted to \$6,910,808.

All three companies are Crown corporations as defined by section 76(c) of the Financial Administration Act, and as such each is required to report annually to the appropriate Minister in compliance with the provisions of that Act.

3. Excess of Sales over Costs and Expenses of Concentrates procured from other Producers

At December 31, 1966 the excess of sales over costs and expenses of concentrates procured from other producers amounted to \$1,131,433. During the current year there was an excess of costs and expenses over sales of \$12,803 leaving a balance at December 31, 1967 of \$1,118,630 to be offset in the period 1968-71 when deliveries will be made at prices which are lower than costs of acquisition.

4. Contracts for Sale of Certain Uranium Concentrates

Income from sales of Company products and services in the amount of \$14,523,678, as shown on the Statement of Income and Expense, includes \$9,914,550 under contracts which provide for payment to be made following shipment as required from time to time before 1975.

5. Government of Canada Stockpile Program

The Treasury Board, with the approval of the Governor in Council, has granted authority for Eldorado Mining and Refining Limited to purchase and stockpile uranium bearing concentrates for the Government of Canada. At December 31, 1967 the Company was the custodian of concentrates thus acquired at a cost of \$69,809,925. The cost of these concentrates, being chargeable to parliamentary appropriations, is therefore not included in the accounts of the Company.

6. Remuneration of Directors

Total remuneration of directors as directors, officers or employees of the Company for the year was \$36,000.

ELDORADO MINING AND REFINING LIMITED

Statement of Sales and Costs of Uranium Concentrates Procured from other Producers

for the year ended December 31, 1967

(with comparative figures for the year ended December 31, 1966)

	1967	1966
Sales under contracts with:		
United Kingdom Atomic Energy Authority..	\$ 26,618,171	\$ 16,462,974
United States Atomic Energy Commission..	1,070,352	12,301,481
	<hr/>	<hr/>
	27,688,523	28,764,455
Costs of concentrates sold	27,701,326	28,801,908
	<hr/>	<hr/>
Excess of costs over sales of concentrates procured from other producers (Note 3)....	\$ 12,803	\$ 37,453
	<hr/>	<hr/>

The accompanying notes are an integral part of the financial statements.

ELDORADO MINING AND REFINING LIMITED

Statement of Surplus

for the year ended December 31, 1967

(with comparative figures for the year ended December 31, 1966)

	1967	1966
Balance at beginning of year.....	\$ 45,176,620	\$ 46,000,425
Net profit for the year.....	269,548	176,195
	<hr/>	<hr/>
	45,446,168	46,176,620
Dividend	—	1,000,000
	<hr/>	<hr/>
Balance at end of year.....	\$ 45,446,168	\$ 45,176,620
	<hr/>	<hr/>

The accompanying notes are an integral part of the financial statements.

AUDITOR GENERAL OF CANADA

Ottawa, February 27, 1968.

The Honourable Jean-Luc Pepin,
Minister of Energy, Mines and
Resources, Ottawa.

Sir,

I have examined the accounts and financial statements of Eldorado Mining and Refining Limited for the year ended December 31, 1967. In compliance with the requirements of section 87 of the Financial Administration Act, I report that, in my opinion:

- (a) proper books of account have been kept by the Company;
- (b) the financial statements of the Company
 - (i) were prepared on a basis consistent with that of the preceding year and are in agreement with the books of account,
 - (ii) in the case of the balance sheet, give a true and fair view of the state of the Company's affairs as at the end of the financial year, and
 - (iii) in the case of the statement of income and expense, give a true and fair view of the income and expense of the Company for the financial year; and
- (c) the transactions of the Company that have come under my notice have been within the powers of the Company under the Financial Administration Act and any other Act applicable to the Company.

Yours faithfully,

A. M. HENDERSON.

Auditor General of Canada.

ELDORADO AVIATION LIMITED

(Incorporated under the Canada Corporations Act)

Balance Sheet

at December 31, 1967

(with comparative figures at December 31, 1966)

ASSETS

	1967	1966
Current Assets:		
Cash	\$ 47,626	\$ 53,241
Accounts receivable:		
Eldorado Mining and Refining Limited	20,245	28,257
Northern Transportation Company Limited ...	—	11,126
Other	13,149	13,517
	<u>33,394</u>	<u>52,900</u>
Operating supplies, at cost ..	62,074	62,165
Prepaid insurance	29,708	16,798
Total Current Assets	<u>172,802</u>	<u>185,104</u>
Capital Assets, at cost:		
Aircraft, including major spare parts	987,321	982,507
Shop, hangar and loading equipment, etc.	40,704	36,589
Office furniture and equipment	9,049	8,795
	<u>1,037,074</u>	<u>1,027,891</u>
Less: Accumulated depreciation	893,548	920,043
	<u>143,526</u>	<u>107,848</u>
	<u>\$ 316,328</u>	<u>\$ 292,952</u>

LIABILITIES

	1967	1966
Current Liabilities:		
Accounts payable	\$ 33,931	\$ 37,263
Capital:		
Capital Stock:		
Authorized — 50,000 shares of \$1 each		
Issued — 28,006 shares, fully paid	28,006	28,006
Surplus:		
Balance at January 1 ...	227,683	227,683
Proceeds of insurance in excess of net book value of helicopter totally destroyed	26,708	—
Balance at December 31	<u>254,391</u>	<u>227,683</u>

Approved on behalf of the Board

W. M. GILCHRIST, *Director*

H. E. LAKE, *Director*

I have examined the above Balance Sheet and the related Statement of Recoverable Expense and have reported thereon under date of February 27, 1968 to the Minister of Energy, Mines and Resources.

A. M. HENDERSON,
Auditor General of Canada.

ELDORADO AVIATION LIMITED

Statement of Recoverable Expense

for the year ended December 31, 1967

(with comparative figures for the year ended December 31, 1966)

	1967	1966
Salaries and wages	\$ 238,312	\$ 223,870
Supplies	180,779	163,995
Repairs	124,136	129,730
Hangar expense	54,942	48,876
Depreciation	29,867	29,486
Employee benefits	27,965	25,844
Insurance	25,710	19,277
Landing fees and radio maintenance	15,862	15,613
Travel	2,524	3,378
Miscellaneous	5,279	10,142
	<u>705,376</u>	<u>670,211</u>
Miscellaneous income	37,227	73,233
Net Expense	<u>\$ 668,149</u>	<u>\$ 596,978</u>

Note: . The above net expense was recovered from:

Eldorado Mining and Refining Limited	\$ 544,359	\$ 462,442
Northern Transportation Company Limited	123,790	134,536
	<u>\$ 668,149</u>	<u>\$ 596,978</u>

AUDITOR GENERAL OF CANADA

Ottawa, February 27, 1968.

The Honourable Jean-Luc Pepin,
Minister of Energy, Mines and
Resources, Ottawa.

Sir,

I have examined the accounts and financial statements of Eldorado Aviation Limited for the year ended December 31, 1967. In compliance with the requirements of section 87 of the Financial Administration Act, I report that, in my opinion:

- (a) proper books of account have been kept by the Company;
- (b) the financial statements of the Company
 - (i) were prepared on a basis consistent with that of the preceding year and are in agreement with the books of account,
 - (ii) in the case of the balance sheet, give a true and fair view of the state of the Company's affairs as at the end of the financial year, and
 - (iii) in the case of the statement of recoverable expense, give a true and fair view of the expense of the Company for the financial year; and
- (c) the transactions of the Company that have come under my notice have been within the powers of the Company under the Financial Administration Act and any other Act applicable to the Company.

Yours faithfully,

A. M. HENDERSON
Auditor General of Canada.

Research and Development

A program to develop the process for zirconium production continued to dominate the activities of the Research and Development Division throughout 1967. Early in the year, testwork results indicated that the complete flowsheet — from zircon sand to nuclear grade metal — could be developed sufficiently rapidly to permit commercial production within a reasonable time. Accordingly, all work on the earlier oxide-to-metal flowsheet was discontinued, and a concerted effort directed towards the overall process.

During the year, all phases of the process were tested on laboratory, small pilot plant, or large semi-commercial scale equipment.

The Eldorado method of producing zirconium incorporates a number of novel features designed to utilize the fund of technological expertise developed over the years in the production of uranium compounds. The end product will be a consolidated metal ingot in contrast to the sponge product of the conventional Kroll process, and it is planned to also carry out the subsequent metallurgical operations to produce extrusion billets for sheath and pressure tube manufacture.

A comprehensive metallurgical assessment of ore from the lower level stopes in the Beaverlodge mine was carried out during 1967, and will be continued as new working places are brought into production. Ore from certain areas in the mine does not respond satisfactorily to the conventional flowsheet, and alternative recovery methods were investigated.

Serving Outside Firms

The Division carried out testwork for a number of outside firms in the field of uranium recovery from ores and concentrates, and did similar work for a United Nations project investigating uranium deposits in underdeveloped countries. The Company's research establishment is particularly well qualified to offer this service to industry, and it is anticipated that this type of activity will increase in the coming years. Other custom work carried out in 1967 included the application of the hot compacting technique developed by the Division, to various materials, and analytical work on a number of samples of ore and electronic compounds.

As in the past several years, the Company again sponsored research projects of direct application to its operations, at three Canadian universities.



Modern, highly sophisticated scientific devices, such as this x-ray spectrograph, are essential tools both of research and productive processes in Eldorado's operations.

Uranium Procurement

The first paragraph of this section deals with deliveries under contracts negotiated by the Company while it acted as the official government purchasing agent for all Canadian-produced uranium. The one remaining contract is with the United Kingdom Atomic Energy Authority, and 2,439,729 pounds were delivered thereunder in 1967. Total deliveries were 46% less than in the previous year and 92% below the 1959 peak year deliveries of 30,996,065 pounds. The value of the uranium delivered in 1967 was \$27,883,216, 31% below the comparable 1966 value and 91% below the 1959 peak year value of \$325,328,282. The average value per pound increased to \$10.97 from \$8.55 in 1966, reflecting an increased percentage of deliveries of deferred material under the higher-priced original contractual arrangements. Some 9,000,000 pounds of U_3O_8 remain to be delivered in completion of the Authority contract.

Deliveries were made during the year by three mines to the Canadian Government stockpile, under the policy announced by the Government in June 1965. However, only one of these, Denison, delivered its full permissible quota. Stanrock and

Eldorado made minimal deliveries in the first few months of the year. The value of uranium in the government stockpiles at the end of 1967 was about \$70,000,000.

More Activity in Industry

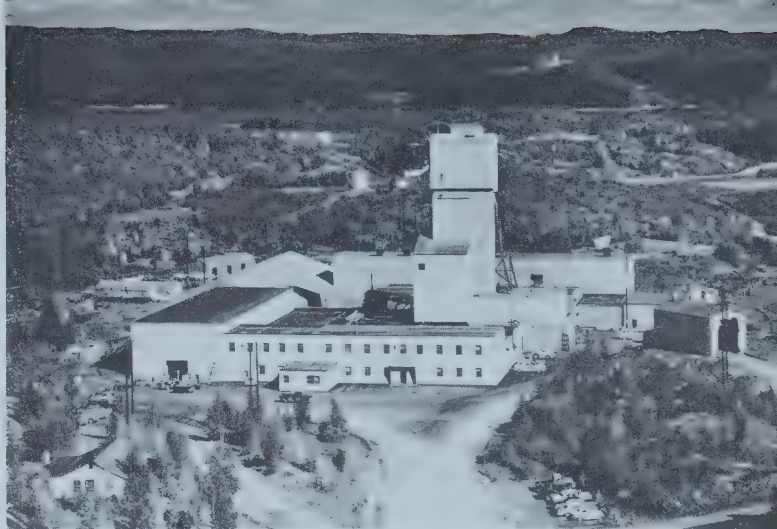
During the year, there was a marked change in the tenor of activity in the uranium industry owing to an increase in the rate at which nuclear plants for power generation were being ordered throughout the world. While most of the increased activity was in the exploration sector, there was also a slightly higher production from existing mines. Denison and Eldorado increased their output by 29% and 19% respectively as compared with 1966.

Many of the large oil companies are beginning to play a very active role in uranium exploration and total land area now under evaluation far exceeds that covered during the 1950-57 period of the first uranium rush.

During the year, five major contracts totalling more than 17,000 tons of U_3O_8 were negotiated between Canadian producers and off-shore buyers. The industry now holds sales contracts for approximately 39,000 tons of U_3O_8 , exclusive of whatever sales may be made to the Government stockpile.

Organization and Manpower

The difficulties arising from a shortage of manpower at the mine operation, to which reference was made in last year's Report, continued during 1967, but some improvement was evident in the later months of the year. This can be attributed in large part to improvements in housing and the provision of amenities, more liberal relocation allowances, and intensive training programs at all levels.



Aerial view of the headframe and service buildings of Eldorado's Fay Mine, looking northeast across the Beaverlodge site.

Under the Company's rental housing program, 46 units were made available to employees' families at Uranium City during the year. In 1968 an additional 54 houses will be added to the program and in 1969 a further 50 units will be erected. This will bring the number of units under the Company's rental program to a total of 160 and the Company's investment in rental housing to about \$2,780,000. The need to maintain the higher output achieved in 1967, together with the requirements of the new Hab mine, makes it essential that there be no lessening of the Company's concerted efforts to search for, select, train and retain qualified personnel.

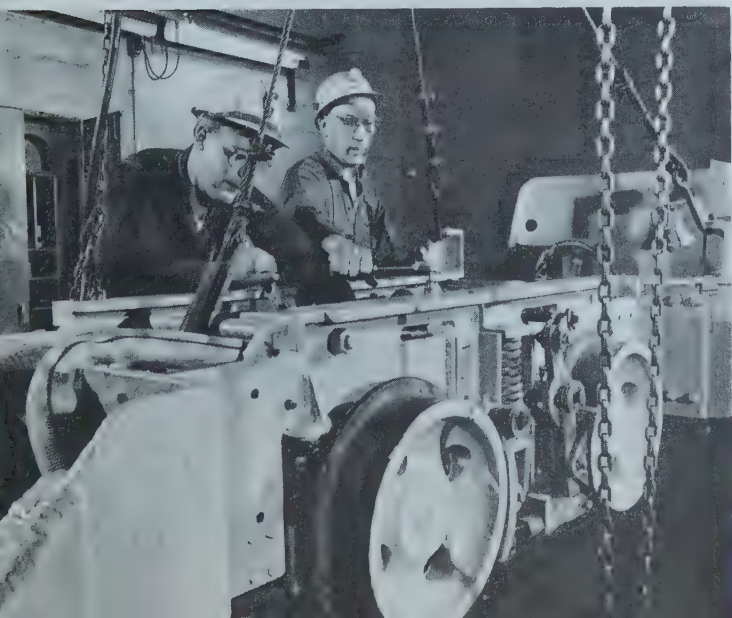
Manpower requirements of the Port Hope Refinery and the Research and Development Division continue to be met without undue difficulty.

The workforce of the Company as a whole at December 31st, 1967, was 923 compared with 795 at the beginning of the year. During the summer, employment was provided for some 57 students at the Beaverlodge operation.

The following is the composition and distribution of the workforce at year-end:

	Hourly-rated employees	Salaried employees	Totals	
			1967	1966
Beaverlodge Operation	497	182	679	549
Port Hope Refinery	100	59	159	158
Research and Development	3	47	50	54
Edmonton Office	—	9	9	8
Head Office	—	26	26	26
	600	323	923	795

Skilled workmen and well-equipped workshops maintain mining equipment such as this underground locomotive in tip-top condition.



Wages and salaries paid in 1967 totalled \$7,255,749 compared with \$6,071,078 in the previous year, an increase of 20%. Company contributions to the pension, employee group insurance and medical insurance plans amounted to \$482,946 in 1967 against \$407,528 in 1966. With the startling increases in medical and hospital insurance rates which have been recently indicated, these costs will rise significantly next year.

In respect of the Company and its two subsidiaries, 10 persons retired on pension during the year. There were 129 persons, including 30 widows and 31 children, receiving benefits out of the Company's Pension Plan at the year-end.

Labour relations under the three collective bargaining agreements in force were largely satisfactory. A three year agreement with the United Mine Workers of America representing Refinery employees was made, effective June 1, 1967. Negotiations for renewal of agreements with the United Steelworkers of America representing the mine employees and with the Civil Service Association of Canada representing laboratory technicians at Ottawa, will take place in 1968.

Eldorado Aviation Limited

The Company owns a DC-4, two DC-3's, three 2-place Bell Helicopters and one 7-passenger S-55 helicopter.

Normally, DC-3 operation is confined to the period April to October, for servicing the agencies of Northern Transportation Company during the navigation season. In 1967, however, one of the DC-3 aircraft was used during the first three months of the year in servicing the Tuktoyaktuk base where a construction project was carried out. Consequently, the total cost of operations in 1967 exceeded the 1966 cost by some 5%, but the cost per ton-mile for the transport aircraft was reduced by 5% to 19.4 cents. This compares with a 20-year average cost per ton-mile of 20.9 cents.

Mileage flown in 1967 increased by 12% over 1966 to 523,290 miles. Ton-miles increased by 16.7% to 3,124,435. A total of 11,239 passengers and 9,700,000 pounds of freight were carried, increases of 25% and 16% respectively. Because of the availability of greater tonnage of precipitate from the mine, the back-haul tonnage increased by 29%, contributing to an improvement in load factor from 70% to 72.8%.

The Company's second DC-3 was dry-leased for approximately eight months of the year.

Utilization of the Bell helicopters was less than



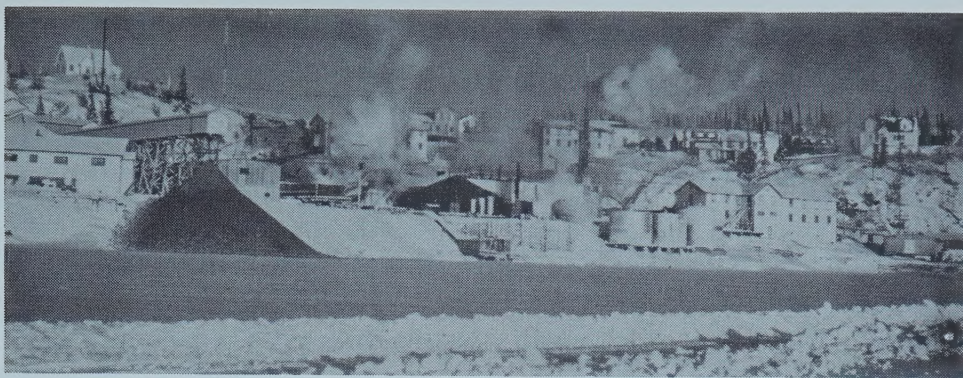
The subsidiary Eldorado Aviation Limited has a key role in exploration and other Company operations. Here the S-55 helicopter delivers fuel to a remote diamond drill site.

half that of the previous year, due to the bringing back into service of the Company's S-55 helicopter, required for the more efficient servicing of diamond drill sites and prospecting and geological survey parties exploring the parent company's uranium holdings in the Beaverlodge area. This helicopter was destroyed in an accident in late July, but was immediately replaced by the purchase of a similar aircraft, with funds available from insurance proceeds.

The coming year will see a significant increase in costs due to very substantial rent increases for hangar space at the Edmonton Industrial Airport, the imposition by the City of Edmonton of an airport passenger tax, and higher insurance costs.

From the beginning of its activities in 1944, the Company's transport aircraft have flown 14,552,000 miles, have operated almost 75,000 hours, and have carried in excess of 89,000 tons of freight and more than 131,000 passengers, at an average per ton-mile cost of less than 21 cents.

At the end of 1967, the staff numbered 34, including two part-time employees. Salaries and wages amounted to \$283,392, while the value of Company contributions to pension and welfare plans was \$24,735.



Taken at the peak of post-World War II operations, this photograph shows the Port Radium Mine of Eldorado at Great Bear Lake, the forerunner of Canada's uranium industry. The mine was shut down in 1960. The Company has now disposed of the remaining buildings and equipment of the mine, but has retained the mineral rights.

Eldorado's Role in the Canadian Uranium Story

Twenty-five years ago the concept of generation of electricity from nuclear sources was still regarded generally as belonging to the realm of science fiction. Today many nuclear reactors are producing and more are coming into existence so rapidly that the Western world will be hard-pressed to supply enough of the vital fuel, uranium. Canada is a major source. Since 1954 alone, uranium has brought more than \$1,780,000,000 into the Canadian economy, and about one dollar in every five has been generated by Eldorado.

Prior to World War II it is probable that not more than one of every 50,000 people in the world had even heard of uranium. Even in scientific circles it was still looked upon as an element of minor interest and with limited possibilities. There was so little demand for it that there was virtually no market, even at prices of \$1.50 to \$2.00 per pound that were well below the cost of production. The advent of the nuclear age has changed all that, and there is growing awareness that within the next decade or so uranium will be in short supply.

The threat of a critical shortage seems paradoxical in face of the fact that the element uranium is known to occur under such a variety of geological conditions that it could probably be found in small quantities in almost any part of the world. Igneous rocks constitute 90 per cent of the Earth's crust, and all such rocks contain at least traces of uranium and its cousin element, thorium. Minute quantities are found in all the world's rivers and seas. Geologically, uranium is less abundant than copper, nickel or zinc, but more abundant than gold or silver.

This abundance is, of course, a relative thing. The fact that uranium exists in trace amounts in rock and sand and sea does not mean that vast quantities can be extracted for man's use. A deposit containing one-tenth of one per cent uranium oxide represents a concentration about 300 times the average abundance in the Earth's crust. By far the greater part of Canada's ore reserves — which are equal to more than one-third the total known reserves of the Western world — average only 0.1 per cent uranium oxide.

Generally speaking, the geology of Canada is favor-

able to the discovery of large and relatively rich deposits of uranium, if enough time, money and technical knowledge are applied to the search. Unlike gold, for example, which is discovered in the form of veins, threads, layers, nuggets and granules, uranium is never found in nature in the metallic state, but always occurs in combination with oxygen as oxides or silicates. The refined metal is white on fresh fracture, but takes on a bronze-like tarnish upon exposure to air. It is not quite as hard as steel, but has a density about two and one-half times that of steel. Its most outstanding physical characteristic is its radioactivity.

The Discovery of Radium

A German chemist, Klaproth, experimented with some unusual black ore that came from a mine at Joachimsthal in Bohemia, and discovered the element uranium in 1789. It remained a mere laboratory curiosity for more than a century. In 1896 Henri Becquerel learned by sheer chance that pitchblende emitted radiation not unlike the x-rays discovered by Röntgen. His published observations set the Curies on the path to an important scientific achievement.

The Curies discovered radium and its transformation product, polonium. They demonstrated that radium exists in all naturally-occurring uranium in the ratio of about one part in 3,000,000, and accounts for its radioactivity.

After it became known that radium would have important applications in the treatment of diseases, particularly tumors and cancers, as well as a number of uses in industry, demand created a fantastic value for the few grains — not grams — that could be derived annually from the only known source, the primitive mine in Bohemia. A quarter-gram was worth \$50,000. When mines were developed in the United States, about 1912, radium became more readily available and the price came down to about \$125,000 a gram, or \$3,500,000 per ounce. Early in the 1920's a Belgian syndicate developed a mine in the Congo, and with substantial quantities of ore and new and better methods of refining it was able to stifle U.S. competition and enjoy a virtual monopoly at a price of about \$70,000 a gram. This continued until the mid-1930's when Canada became a major producer of radium.

The Mine that Broke the Monopoly

In the late 1920's Gilbert Labine of Eldorado Gold Mines Limited undertook aerial prospecting in the Far North, and was rewarded with the finding not only of silver and cobalt along the eastern shore of Great Bear Lake, but of substantial quantities of pitchblende. Claims were staked and development of the mine was begun as quickly as equipment could be brought in, virtually all of it by air-lift in the small aircraft available at the time. Initial operations were directed mainly towards the silver, cobalt and gold values in the ore, but it soon became apparent the real wealth of the mine lay in the pitchblende.

A small refinery was established at Port Hope, Ontario almost 3,000 miles from the mine itself. Shipping of concentrates by air, water and rail began in 1932. The refinery made its first delivery of Canadian-produced radium in 1933. In November, 1936, it completed production of its first ounce (28 grams) of radium, and by 1938 a monthly output of 2.5 grams was reported. The actual product of the refinery was radium bromide of 90 per cent purity, which was sent to England for accurate determination of radio-active content, final refinement, and preparation into usable form.

Even though the amounts involved seem relatively minute, the rising Canadian production broke the Belgian monopoly and the price of radium dropped rapidly. In 1940 demand had diminished, substantial inventories were on hand, labor was scarce, so Eldorado closed the Port Radium mine.

Concurrent with the production of radium through the 1930's Eldorado had sold significant quantities of silver from the mine and had developed a small market for such uranium salts as yellow and orange sodium uranate and black oxide, mainly for use in the coloring of glass and ceramics. The price of these salts ranged from \$2.50 to \$2.92 per pound in 1938.

Eldorado Becomes a Crown Company

An urgent need for uranium in quantity arose with the inception in 1942 of the Manhattan Project, the joint British-United States-Canadian undertaking which eventually brought forth the atomic bomb. Canada's role was to supply the uranium raw material, and the Government requested the re-opening of the Port Radium mine on an emergent basis, but gave no hint as to the reason. The mine and mill, as well as the Port Hope refinery, were in full operation by early 1943. Shipments of uranium were made, but it is believed the actual material used for the first atomic bomb was not of Canadian origin.

The Company name was changed from Eldorado Gold Mines Limited to Eldorado Mining and Refining Limited in June, 1943. Late in that year, when it became evident that the atomic bomb would be feasible, the three governments concerned decided that they should at once gain complete control of uranium resources within their

respective territories. On January 28, 1944, Eldorado was expropriated and the operation was taken over by the Crown-owned Eldorado Mining and Refining (1944) Limited. Northern Transportation Company Limited, a wholly-owned subsidiary of Eldorado, was one of the assets acquired.

The Canadian Uranium Boom

While the ore of the Port Radium mine was exceedingly rich in uranium content, the deposit eventually gave out and the mine was placed on a caretaker basis in September, 1960. In the meantime, in the late 1940's, Eldorado prospectors had found important deposits in the Lake Athabasca region, leading to development of the Beaverlodge mine which went into production in 1953. Eldorado continued to be Canada's sole producer of uranium until cold war demands created new and urgent demands which led to the discovery and development of other major deposits, especially in the Blind River and Bancroft areas of Ontario and the Beaverlodge region of Northwestern Saskatchewan. By 1958 there were 25 producing mines in Canada, and the peak output of almost 31,000,000 pounds of uranium oxide was attained the following year.

The amount of uranium provided by Eldorado for military purposes during World War II and up to 1954 is still classified information. However, the Company's revenue from 1944 to the end of 1954, from the sale of uranium and from some sales and rentals of radium, was about \$82,000,000. Its income from uranium sales in the period 1955-67 inclusive was \$288,210,605, and in the same term its revenue from operation of the refinery amounted to \$40,133,069.

From its original investment of \$9,246,877 in acquiring ownership of Eldorado, the Canadian Government has derived a return of \$34,740,000 in dividends and redemption of shares. From 1944 to the end of 1967 the Company has paid Federal taxes, provincial royalties, and grants in lieu of municipal taxes, amounting to a total of \$36,626,000. The net worth of the Company at the end of 1967 was \$52,000,000.

History of Eldorado Aviation

The remoteness of the Port Radium mine made air transportation essential from the beginning. In 1944 Eldorado bought its own aircraft to assist in field exploration work and the movement of personnel, perishable goods, and emergency supplies. The service was expanded and a regular schedule instituted with the inception of the Beaverlodge mine, and in 1953 the Aviation Division was incorporated as a wholly-owned subsidiary, Eldorado Aviation Limited. It provides air service at cost for Eldorado and Northern Transportation Company Limited.

The Company's transport aircraft have flown 14,500,000 miles and carried more than 89,000 tons of freight and 131,000 passengers.

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